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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LISH, PETER J

ART UNIT

PAPER NUMBER

1754

DATE MAILED: 03/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/780,303

Applicant(s)

PANTER ET AL.

Examiner

Peter J Lish

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 20-27 is/are rejected.
- 7) ☒ Claim(s) 18 and 19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Applicant's arguments with respect to claims 1-27 have been considered but are moot in view of the new ground(s) of rejection. Regarding applicant's argument that Uchida et al. teach a calcinations step entirely different from a carbonization step, examiner notes that while the difference between the two terms is noted, the "calcinations" of Uchida et al. is clearly a carbonization treatment. Uchida et al. later recite that the "calcination" may be executed in a non-oxidizing atmosphere at 400 °C to 3,000 °C (column 6, lines 64-67). This is a well-known carbonization treatment. Additionally, the process of Uchida et al. is taught to produce a carbon-carbon composite, which would require a carbonization treatment. The "calcination" of Uchida et al. clearly performs this carbonization treatment.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support in the specification for the range "less than and within 5 °C of the flash point" now claimed.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pepper et al. (USPN 4,526,770).

Pepper et al. disclose a process wherein a PAN carbon precursor fiber is continuously drawn through a furnace by rollers located outside the furnace (Figure 1) in order to effect stabilization of the fiber. The fiber is then subsequently drawn through a carbonization heating zone, still under tension, located in another furnace. It would have been obvious to one of ordinary skill at the time of invention to relocate the carbonization heating zone inside the same furnace as the stabilization heating zones, in order to save space and capital costs. The use of a single furnaces to accomplish this heating is held to be obvious by *In re Japinkse* (86 USPQ 70), which holds that the reaarangement of locations of parts is obvious to one of ordinary skill

Claims 1-3, 7, 9, 13-17, 20-24, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pepper et al. (USPN 4,526,770) taken with Uchida et al. (USPN 5,733,484).

Pepper et al. disclose a process for the stabilization and carbonization of PAN fibers. The PAN fibers are passed through an oxidation, or stabilization, treatment under tension in order to produce higher strength fibers. The oxidation treatment consists of blowing an oxidizing gas, such as air, over the fibers while the fibers are heated from a temperature of about 180 °C at the entrance of the furnace to 300 °C at the exit of the furnace. This may be accomplished using a

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single furnace with a number of independent heating zones or rather with a series of separate furnaces with one or more heating zones (column 5, line 64 to column 6, line 8). The residence time of the fiber in the stabilization treatment is between about $\frac{1}{2}$ and 120 minutes. The exact temperature or residence time in each heating zone are not explicitly taught by Pepper et al., however, finding the optimum temperature and residence time within each heating zone and correspondingly adjusting them would have been obvious to one of ordinary skill at the time of invention. Because the temperatures and residence times of the applicant are within the ranges taught by Pepper et al., and could have been found through routine experimentation, they are considered to be an optimization of a known process, held to be obvious under *In re Boesch* (205 USPQ 215) unless significantly unexpected and difference results can be shown.

Pepper et al. also teach the carbonization of the stabilized PAN fibers at temperatures between 300 °C and 800 °C in a non-oxidizing atmosphere. They do not teach that this same process may occur without the use of a non-oxidizing atmosphere. However, Uchida et al. teach a process for the carbonization of a stabilized carbon precursor fiber which performed at a relatively low temperature, for example, a temperature of 400 °C to 600 °C and for a short time, may be performed in an oxidizing atmosphere, such as air (column 6, lines 9-12). It would have been obvious to one of ordinary skill at the time of invention to perform a short and low temperature (say 400 °C) carbonization in an oxidizing atmosphere, as taught by Uchida et al., on the stabilized PAN fibers of Pepper et al. in order to eliminate the need for an additional gas supply, such as an inert gas.

Pepper et al. also teach the graphitization of the carbonized fibers. Regarding claims 22 and 23, it is expected that a multizone heating furnace will not provide for the passage of the

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fiber through ambient air between independent heating zones. It is furthermore expected that a series of separate furnaces will provide for the passage of the fiber through ambient air between independent heating zones.

Regarding claims 15-17, In addition to is application to claim 14, above, Pepper et al. teach heating the PAN fiber to a temperature up to about 260 °C in an oxidizing atmosphere, such as air. There is no difference seen between the process of Pepper et al. and that of applicant.

Claims 4-6 and 25-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Pepper et al. and Uchida et al. as applied to claims 1 and 9 above, and further in view of US Patent to McCullough (USPN 5,700,573). McCullough teaches a means to produce biregional fibers from a homogenous polymeric material whereas the outer fiber portion of the polymeric material is oxidation stabilized and then carbonized to form two distinct regions in the fiber, the homogenous polymeric fiber preferably being a standard acrylic polymer. (column 3, lines 14-30). Because this process is carried out under similar conditions to the production of single region carbon fibers, it would have been obvious to one of ordinary skill at the time of invention to include the partial oxidation and carbonization method of McCullough in the process of Pepper et al. taken with Uchida et al. in order to produce biregional fibers.

Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pepper et al. and Uchida et al. as applied to claim 9 above, and further in view of Berkebile et al. (USPN 5,316,654).

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Berkebile, however, teaches a process for the stabilization of carbon fiber precursors where a single heating zone is held close to the softening point. In this process, the fiber is held just below the "glass transition temperature", or "the highest temperature allowable for satisfactory stabilization" (column 6, lines 66-69) for about 50 minutes. The fiber is then heated at a temperature of 200 °C for 30 minutes, 265 °C at 10 minutes, and finally 305 °C for 10 minutes (column 6, lines 10-29). Thus it would have been obvious to one of ordinary skill at the time of invention to stabilize the fiber of Pepper et al. by heating to just below its softening point in one furnace only, where it would be held for the longest amount of time, as taught by Berkebile et al., in order to provide that the fibers maintain their stiffness, while at the same time the temperature represents the highest temperature allowable for satisfactory stabilization to occur. The use of two furnaces to accomplish this heating is held to be obvious by *In re Japinkse* (86 USPQ 70), which holds that the rearrangement of locations of parts is obvious to one of ordinary skill.

Allowable Subject Matter

Claims 18-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Lish whose telephone number is 703-308-1772. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-305-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

PL
March 5, 2003



STUART L. HENDRICKSON
PRIMARY EXAMINER